

Technical Data [ข้อมูลทางเทคนิค] [อ้างอิงจาก ISO898: 2013 Fifth edition]

ISO 898 [8.8] : Bolts Set [Screw+Nut+Washer]

1. Materials

1.1 Material for Bolts

Table 1. Chemical Composition limit for Steels

Property Class	Material and heat treatment	Chemical composition limit (cast analysis, %)					Tempering Temperature
		C		P	S	B	°C
		min.	max.	max.	max.	max.	min.
8.8	Carbon steel with additives (e.g. Boron or Mn or Cr) quenched and tempered	0.15	0.40	0.025	0.025	0.003	425
	Carbon steel quenched and tempered	0.25	0.55	0.025	0.025	0.003	425
	Alloy steel quenched and tempered	0.20	0.55	0.025	0.025	0.003	425

1.2 Material for Nuts

Table 2. Chemical Composition limit for Steels

Property Class	Material	Chemical composition limit (cast analysis, %)				
		C		P	S	
		max.	min.	max.	max.	max.
8	High nut [style 2]	Carbon steel ^d	0.58	0.25	0.060	0.150
8	Regular nut [style 1] D ≤ M16	Carbon steel ^d	0.58	0.25	0.060	0.150
8 ^c	Regular nut [style 1] D > M16	Carbon steel, QT ^c	0.58	0.30	0.048	0.058

1.3 Material for Washers

Table 3. Chemical Composition limit for Steels

Property Class	Material	Chemical composition limit (cast analysis, %)				
		C		P	S	B
		max.	min.	max.	max.	max.
HV100	Carbon steel			*Note		
HV200	Carbon steel			*Note		
HV300	Carbon steel, QT	0.80	0.17	0.035	0.035	0.003
HV380	Carbon steel, QT	0.80	0.40	0.035	0.035	0.003

*Note : Material selection shall be at the manufacturer's discretion, provided that the requirements of mechanical properties.

2. Mechanical and Physical Properties

2.1 Mechanical Properties of Bolts

Table 4. Mechanical and Physical Properties of Bolts, Screws and Studs

No.	Mechanical or Physical Property	Property Class								
		4.6	4.8	5.6	5.8	8.8		10.9	12.9	
						d ≤ 16 mm. ^a	d ≥ 16 mm. ^b			
1	Tensile strength, R_m , MPa	nom. ^c	400	400	500	500	800	800	1,000	1,200
		min.	400	420	500	520	800	830	1,040	1,220
2	Lower yield strength, R_{eL} ^d , MPa	nom. ^c	240	-	300	-	-	-	-	-
		min.	240	-	300	-	-	-	-	-
3	Stress at 0.2 % non-proportional elongation, $R_{p0.2}$, MPa	nom. ^c	-	-	-	-	640	640	900	1,080
		min.	-	-	-	-	640	660	940	1,100
	Stress under proof load, S_p ^f , MPa	nom.	225	310	280	380	580	600	830	970
4	Proof strength ratio [$S_{p,nom}/R_{eL,min}$ or $S_{p,nom}/R_{p0.2,min}$ or $S_{p,nom}/R_{pf,min}$]		0.94	0.91	0.93	0.90	0.91	0.91	0.88	0.88
5	Percentage elongation after fracture for machined test pieces, A, %	min.	22	-	20	-	12	12	9	8
6	Percentage reduction of area after fracture for machined test pieces, Z, %	min.	-	-	-	-	52	52	48	44
7	Elongation after fracture for full-size fasteners, Af	min.	-	0.24	-	0.22	-	-	-	-
8	Rockwell hardness,	min.	67 HRB	71 HRB	79 HRB	82 HRB	22 HRC	23 HRC	32 HRC	39 HRC
		max.	95 ^g HRB	95 ^g HRB	95 ^g HRB	95 ^g HRB	32 HRC	34 HRC	39 HRC	44 HRC

a Values do not apply to structural bolting.

b For structural bolting $d \geq M12$.

c Nominal values are specified only for the purpose of the designation system for property classes.

d In cases where the lower yield strength, R_{eL} , cannot be determined, it is permissible to measure the stress at 0.2 % non-proportional elongation $R_{p0.2}$.

e For the property classes 4.8, 5.8 and 6.8, the values for $R_{pf,min}$ are under investigation. The values at the time of publication of this part of ISO 898 are given for calculation of the proof stress ratio only. They are not test values.

f Proof loads are specified in Tables 4 and 6.

g Hardness determined at the end of a fastener shall be 250 HV, 238 HB or 99.5 HRB maximum.

2.2 Mechanical Properties of Nuts

Table 5. Hardness properties for nuts with coarse thread

Thread D	Property Class											
	04		05		5		8		10		12	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
M5 ≤ D ≤ M16 M16 ≤ D ≤ M39	Vickers Hardness, HV											
	188	302	272	353	130	302	200	302	272	353	295 ^c	353
M5 ≤ D ≤ M16 M16 ≤ D ≤ M39	Rockwell hardness, HRC											
	—	30	26	36	—	30	—	30	26	36	29 ^c	36

Table 6. Proof load values for nuts with coarse thread

Thread D	Pitch P	[Proof load, N]					
		04	05	5	8	10	12
M8	1.25	13,900	18,300	21,600	31,800	38,100	42,500
M10	1.5	22,000	29,000	34,200	50,500	60,300	67,300
M12	1.75	32,000	42,200	51,400	74,200	88,500	100,300
M14	2.0	43,700	57,500	70,200	101,200	120,800	136,900
M16	2.0	59,700	78,500	95,800	138,200	164,900	186,800
M18	2.5	73,000	96,000	121,000	176,600	203,500	230,400
M20	2.5	93,100	122,500	154,400	225,400	259,700	294,000
M22	2.5	115,100	151,500	190,900	278,800	321,200	363,600
M24	3.0	134,100	176,500	222,400	324,800	374,200	423,600
M27	3.0	174,400	229,500	289,200	422,300	486,500	550,800
M30	3.5	213,200	280,500	353,400	516,100	594,700	673,200
M33	3.5	263,700	347,000	437,200	638,500	735,600	832,800
M36	4.0	310,500	408,500	514,700	751,600	866,000	980,400
M39	4.0	370,900	488,000	614,900	897,900	1,035,000	1,171,000

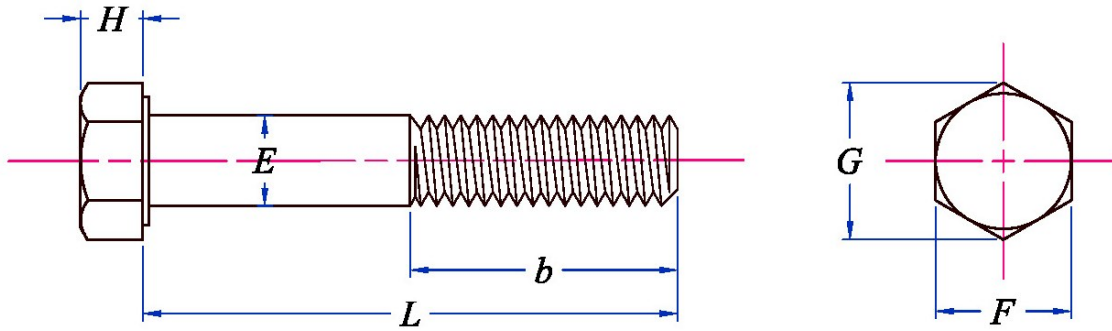
2.3 Mechanical Properties of Washers

Table 7. Mechanical Properties of Washer

Properties class	100 HV	200 HV	300 HV	380 HV
Vicker hardness, HV	min.	100	200	300
	max.	200	300	370
Rockwell hardness, HRC	min.	-	-	30
	max.	-	-	39

3. Dimension

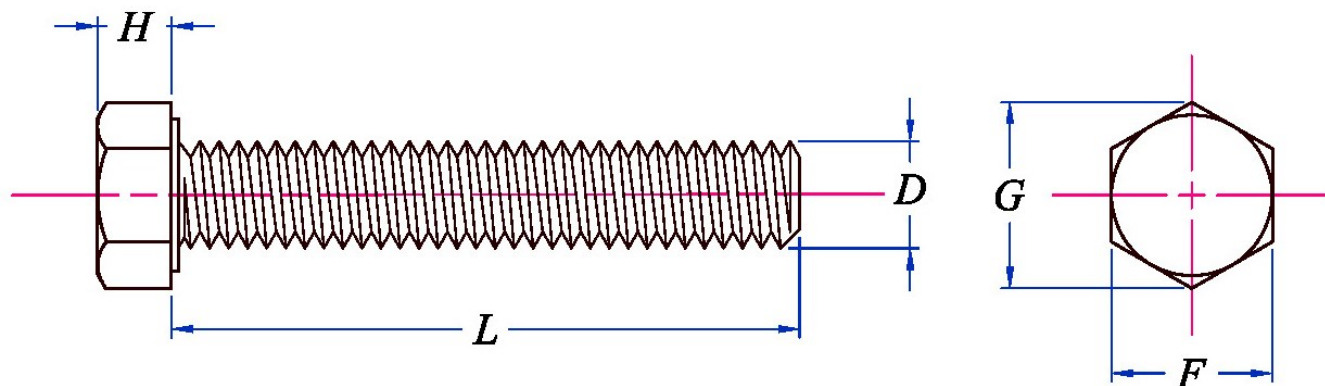
3.1 Dimension of Bolts



Dimension of DIN 931 Hexagon Head Screws

Unit: mm.

Size	Body Diameter, E		Width Across Flats, F		Width Across Corner, G	Thickness, H			DIN 931 Thread Length, b		
	Min.	Max.	Nom./Max.	Min.	Min	Nom.	Min	Max	≤125 mm.	125-200 mm.	>200 mm.
M3x0.5	3.00	2.86	5.50	5.32	6.01	2.00	1.88	2.12	12.00	-	-
M4x0.7	4.00	3.82	7.00	6.78	7.66	2.80	2.68	2.92	14.00	-	-
M5x0.8	5.00	4.82	8.00	7.78	8.79	3.50	3.35	3.65	16.00	22.00	-
M6x1.0	6.00	5.82	10.00	9.78	11.05	4.00	3.85	4.15	18.00	24.00	-
M7x1.0	7.00	6.78	11.00	10.73	12.12	4.80	4.65	4.95	20.00	26.00	-
M8x1.25	8.00	7.78	13.00	12.73	14.38	5.30	5.15	5.45	22.00	28.00	-
M10x1.5	10.00	9.78	17.00	16.73	18.90	6.40	6.22	6.58	26.00	32.00	45.00
M12x1.75	12.00	11.73	19.00	18.67	21.10	7.50	7.32	7.68	30.00	36.00	49.00
M14x2.0	14.00	13.73	22.00	21.67	24.49	8.80	8.62	8.98	34.00	40.00	53.00
M16x2.0	16.00	15.73	24.00	23.67	26.75	10.00	9.82	10.18	38.00	44.00	57.00
M18x2.5	18.00	17.73	27.00	26.67	30.14	11.50	11.28	11.72	42.00	48.00	61.00
M20x2.5	20.00	19.67	30.00	29.67	33.53	12.50	12.28	12.72	46.00	52.00	65.00
M22x2.5	22.00	21.67	32.00	32.61	35.72	14.00	13.78	14.22	50.00	56.00	69.00
M24x3.0	24.00	23.67	36.00	35.38	39.98	15.00	14.78	15.22	54.00	60.00	73.00
M27x3.0	27.00	26.67	41.00	40.00	45.20	17.00	16.65	17.35	60.00	66.00	79.00
M30x3.5	30.00	29.67	46.00	45.00	50.85	18.70	18.28	19.12	66.00	72.00	85.00
M33x3.5	33.00	32.61	50.00	49.00	55.37	21.00	20.58	21.42	72.00	78.00	91.00
M36x4.0	36.00	35.61	55.00	53.80	60.79	22.50	22.08	22.92	78.00	84.00	97.00
M39x4.0	39.00	38.61	60.00	58.80	66.44	25.00	24.58	25.42	84.00	90.00	103.00
M42x4.5	42.00	41.61	65.00	63.80	72.02	26.00	25.58	26.42	90.00	96.00	109.00
M45x4.5	45.00	44.38	70.00	68.10	76.95	28.00	27.58	28.42	96.00	102.00	115.00
M48x5.0	48.00	47.38	75.00	73.10	82.60	30.00	29.58	30.42	102.00	108.00	121.00



Dimension of DIN 933 Hexagon Head Screws

Unit: mm.

Size	Thread Diameter, D		Width Across Flats, F		Width Across Corner, G	Thickness , H		
	Min.	Max.	Nom./Max.	Min.	Min	Nom.	Min	Max
M3x0.5	3.00	2.86	5.50	5.32	6.01	2.00	1.88	2.12
M4x0.7	4.00	3.82	7.00	6.78	7.66	2.80	2.68	2.92
M5x0.8	5.00	4.82	8.00	7.78	8.79	3.50	3.35	3.65
M6x1.0	6.00	5.82	10.00	9.78	11.05	4.00	3.85	4.15
M7x1.0	7.00	6.78	11.00	10.73	12.12	4.80	4.65	4.95
M8x1.25	8.00	7.78	13.00	12.73	14.38	5.30	5.15	5.45
M10x1.5	10.00	9.78	17.00	16.73	18.90	6.40	6.22	6.58
M12x1.75	12.00	11.73	19.00	18.67	21.10	7.50	7.32	7.68
M14x2.0	14.00	13.73	22.00	21.67	24.49	8.80	8.62	8.98
M16x2.0	16.00	15.73	24.00	23.67	26.75	10.00	9.82	10.18
M18x2.5	18.00	17.73	27.00	26.67	30.14	11.50	11.28	11.72
M20x2.5	20.00	19.67	30.00	29.67	33.53	12.50	12.28	12.72
M22x2.5	22.00	21.67	32.00	32.61	35.72	14.00	13.78	14.22
M24x3.0	24.00	23.67	36.00	35.38	39.98	15.00	14.78	15.22
M27x3.0	27.00	26.67	41.00	40.00	45.20	17.00	16.65	17.35
M30x3.5	30.00	29.67	46.00	45.00	50.85	18.70	18.28	19.12
M33x3.5	33.00	32.61	50.00	49.00	55.37	21.00	20.58	21.42
M36x4.0	36.00	35.61	55.00	53.80	60.79	22.50	22.08	22.92
M39x4.0	39.00	38.61	60.00	58.80	66.44	25.00	24.58	25.42
M42x4.5	42.00	41.61	65.00	63.80	72.02	26.00	25.58	26.42
M45x4.5	45.00	44.38	70.00	68.10	76.95	28.00	27.58	28.42
M48x5.0	48.00	47.38	75.00	73.10	82.60	30.00	29.58	30.42

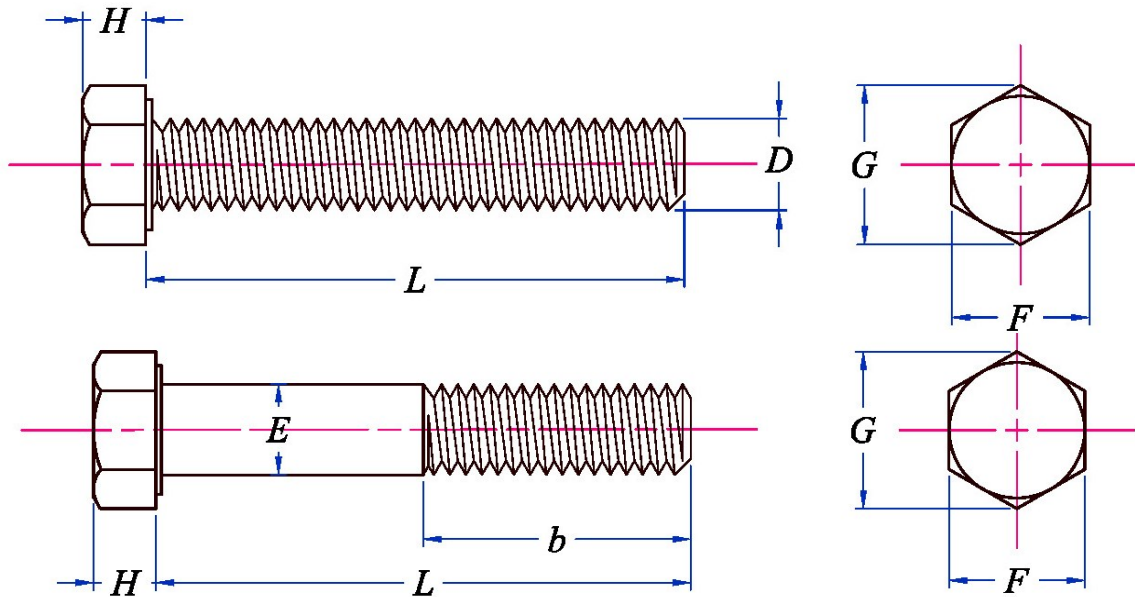
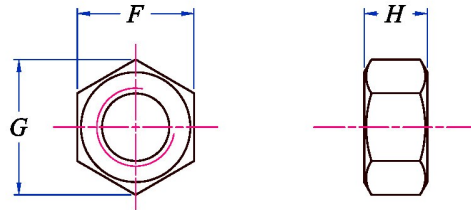


Table 2 Hex Bolts, ANSI B18.2.1

Unit: inch.

Size	Body Diameter, E		Width Across Flats, F			Width Across Corner, G		Thickness, H			Thread Length, b	
	Min.	Max.	Nom.	Min.	Max.	Min	Max	Nom.	Min	Max	≤6 in.	>6 in.
1/4" - 20	0.237	0.260	7/16	0.425	0.438	0.484	0.505	11/64	0.150	0.188	0.750	1.000
5/16" - 18	0.298	0.324	1/2	0.484	0.500	0.552	0.577	7/32	0.195	0.235	0.875	1.125
3/8" - 16	0.360	0.388	9/16	0.544	0.562	0.620	0.650	1/4	0.226	0.268	1.000	1.250
7/16" - 14	0.421	0.452	5/8	0.603	0.625	0.687	0.722	19/64	0.272	0.316	1.125	1.375
1/2" - 13	0.482	0.515	3/4	0.725	0.750	0.826	0.866	11/32	0.302	0.364	1.250	1.500
5/8" - 11	0.605	0.642	15/16	0.906	0.938	1.033	1.083	27/64	0.378	0.444	1.500	1.750
3/4" - 10	0.729	0.768	1.1/8	1.088	1.125	1.240	1.299	1/2	0.455	0.524	1.750	2.000
7/8" - 9	0.852	0.895	1.5/16	1.269	1.312	1.447	1.516	37/64	0.531	0.604	2.000	2.250
1" - 8	0.976	1.022	1.1/2	1.450	1.500	1.653	1.732	43/64	0.591	0.700	2.250	2.500
1 1/8" - 7	1.098	1.149	1.11/16	1.631	1.688	1.859	1.949	3/4	0.658	0.780	2.500	2.750
1 1/4" - 7	1.223	1.277	1.7/8	1.812	1.875	2.066	2.165	27/32	0.749	0.876	2.750	3.000
1 3/8" - 6	1.345	1.404	2.1/16	1.994	2.062	2.273	2.382	29/32	0.810	0.940	3.000	3.250
1 1/2" - 6	1.470	1.531	2.1/4	2.175	2.250	2.480	2.598	1	0.902	1.036	3.250	3.500
1 3/4" - 5	1.716	1.785	2.5/8	2.538	2.625	2.893	3.031	1.5/32	1.054	1.196	3.750	4.000
2" - 4.5	1.964	2.039	3.00	2.900	3.000	3.306	3.464	1.11/32	1.175	1.388	4.250	4.500
2 1/4" - 4.5	2.214	2.305	3.3/8	3.262	3.375	3.719	3.897	1.1/2	1.327	1.548	4.750	5.000
2 1/2" - 4	2.461	2.559	3.3/4	3.625	3.750	4.133	4.330	1.21/32	1.479	1.708	5.250	5.500
2 3/4" - 4	2.711	2.827	4.1/8	3.988	4.125	4.546	4.763	1.13/16	1.632	1.869	5.750	6.000
3" - 4	2.961	3.081	4.1/2	4.350	4.500	4.959	5.196	2.00	1.815	2.060	6.250	6.500
3 1/4" - 4	3.210	3.335	4.7/8	4.712	4.875	5.372	5.629	2.3/16	1.936	2.251	6.750	7.000
3 1/2" - 4	3.461	3.589	5.1/4	5.075	5.250	5.786	6.062	2.5/16	2.057	2.380	7.250	7.500
3 3/4" - 4	3.726	3.858	5.5/8	5.437	5.625	6.198	6.495	2.1/2	2.241	2.572	7.750	8.000
4" - 4	3.975	4.111	6	5.800	6.000	6.612	6.928	2.11/16	2.424	2.764	8.250	8.500

3.2 Dimension of Nuts



DIN 934 Hexagon Nuts

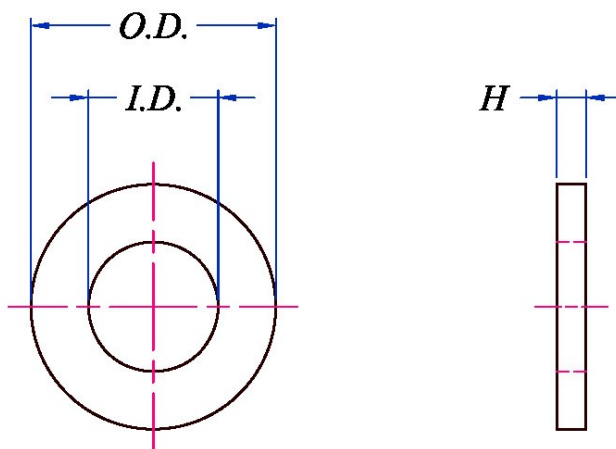
Size	Width Across Flats, F		Width Across Corner, G		Thickness H		Size	Width Across Flats, F		Width Across Corner, G		Thickness H	
	Nom./Max.	Min	Min	Nom./Max.	Min	Nom./Max.		Min	Min	Nom./Max.	Min		
	M3 x 0.8	5.50	5.32	6.01	2.40	2.15		M33 x 3.5	50.00	49.00	55.37	26.00	24.70
M4 x 0.7	7.00	6.78	7.66	3.20	2.90	M36 x 4.0	55.00	53.80	60.79	29.00	27.40		
M5 x 0.8	8.00	7.78	8.79	4.00	3.70	M39 x 4.0	60.00	58.80	66.44	31.00	29.40		
M6 x 1.0	10.00	9.78	11.05	5.00	4.70	M42x 4.5	65.00	63.10	71.30	34.00	32.40		
M8 x 1.25	13.00	12.73	14.38	6.50	6.14	M45x 4.5	70.00	68.10	76.95	36.00	34.40		
M10 x 1.5	17.00	16.73	18.90	8.00	7.64	M48x 5.0	75.00	73.10	82.60	38.00	36.40		
M12 x 1.75	19.00	18.67	21.10	10.00	9.64	M52x 5.0	80.00	78.10	88.25	42.00	40.40		
M14 x 2.0	22.00	21.67	24.49	11.00	10.30	M56x 5.5	85.00	82.80	93.56	45.00	43.40		
M16 x 2.0	24.00	23.67	26.75	13.00	12.30	M60x 5.5	90.00	87.80	99.21	48.00	46.40		
M18 x 2.5	27.00	26.16	29.56	15.00	14.30	M64x 6.0	95.00	92.80	104.86	51.00	49.10		
M20 x 2.5	30.00	29.16	32.95	16.00	14.90	M68x 6.0	100.00	97.80	110.51	54.00	52.10		
M22 x 2.5	32.00	31.00	35.03	18.00	16.90	M72x 6.0	105.00	102.80	116.16	58.00	56.10		
M24 x 3.0	36.00	35.00	39.55	19.00	17.70	M80x 6.0	115.00	112.80	127.46	64.00	62.10		
M27 x 3.0	41.00	40.00	45.20	22.00	20.70	M90x 6.0	130.00	127.50	144.08	72.00	70.10		
M30 x 3.5	46.00	45.00	50.85	24.00	22.70	M100x 6.0	145.00	142.50	161.02	80.00	78.10		

Table 4 Hex Nuts (UNC Thread), ANSI B18.2.2

Unit: inch

Size	Width Across Flats, F		Width Across Corner, G		Thickness, H	
	Min	Max	Min	Max	Min	Max
1/4" -- 20	0.4280	0.4380	0.4880	0.5050	0.2120	0.2260
5/16" -- 18	0.4890	0.5000	0.5570	0.5770	0.2580	0.2730
3/8" -- 16	0.5510	0.5630	0.6280	0.6500	0.3200	0.3370
1/2" -- 13	0.7360	0.7500	0.8400	0.8660	0.4270	0.4480
5/8" -- 11	0.9220	0.9380	1.0510	1.0830	0.5350	0.5590
3/4" -- 10	1.0880	1.1250	1.2400	1.2990	0.6170	0.6650
7/8" -- 9	1.2690	1.3120	1.4470	1.5160	0.7240	0.7760
1" -- 8	1.4500	1.5000	1.6530	1.7320	0.8310	0.8870
1 1/8" -- 7	1.6310	1.6880	1.8590	1.9490	0.9390	0.9990
1 1/4" -- 7	1.8112	1.8750	2.0660	2.1650	1.0300	1.0940
1 1/2" -- 6	2.1750	2.2500	2.4800	2.5980	1.2450	1.3117
1 3/4" -- 5	2.5380	2.6250	2.8930	3.0310	1.4600	1.5400
2" -- 4.5	2.9000	3.0000	3.3060	3.4640	1.6750	1.7630
2 1/4" -- 4.5	3.2630	3.3750	3.7190	3.8970	1.8900	1.9860
2 1/2" -- 4	3.6250	3.7500	4.1330	4.3300	2.1050	2.2090
2 3/4" -- 4	3.9880	4.1250	4.5460	4.7630	2.3190	2.4310
3" -- 4	4.3500	4.5000	4.9590	5.1960	2.5340	2.6540
3 1/4" -- 4	4.7130	4.8750	5.3730	5.6290	2.7490	2.8770
3 1/2" -- 4	5.0750	5.2500	5.7860	6.0620	2.9640	3.1100
3 3/4" -- 4	5.4380	5.6250	6.1990	6.4950	3.1780	3.3220
4" -- 4	5.8000	6.0000	6.6120	6.9280	3.3930	3.5450

3.2 Dimension of Nuts



DIN 125-1 Steel Washers

Unit: mm.

Size (M)	Inside Diameter, I.D.		Outside Diameter, O.D.		Thickness, H		
	Min./Nom.	Max.	Max./Nom.	Min.	Nom.	Max.	Min.
3.0	3.20	3.38	7.00	6.64	0.50	0.55	0.45
3.5	3.70	3.88	8.00	7.64	0.50	0.55	0.45
4.0	4.30	4.48	9.00	8.64	0.80	0.90	0.70
5.0	5.30	5.48	10.00	9.64	1.00	1.10	0.90
6.0	6.40	6.62	12.00	11.57	1.60	1.80	1.40
8.0	8.40	8.62	16.00	15.57	1.60	1.80	1.40
10.0	10.50	10.77	20.00	19.48	2.00	2.20	1.80
12.0	13.00	13.27	24.00	23.48	2.50	2.70	2.30
14.0	15.00	15.27	28.00	27.48	2.50	2.70	2.30
16.0	17.00	17.27	30.00	29.48	3.00	3.30	2.70
18.0	19.00	19.33	34.00	33.38	3.00	3.30	2.70
20.0	21.00	21.33	37.00	36.38	3.00	3.30	2.70
22.0	23.00	23.33	39.00	38.38	3.00	3.30	2.70
24.0	25.00	25.33	44.00	43.38	4.00	4.30	3.70
27.0	28.00	28.33	50.00	49.38	4.00	4.30	3.70
30.0	31.00	31.39	56.00	55.26	4.00	4.30	3.70
33.0	34.00	34.62	60.00	58.80	5.00	5.60	4.40
36.0	37.00	37.62	66.00	64.80	5.00	5.60	4.40
39.0	40.00	40.62	72.00	70.80	6.00	6.60	5.40
42.0	43.00	43.62	78.00	76.80	7.00	8.00	6.00
45.0	46.00	46.62	85.00	83.60	7.00	8.00	6.00
48.0	50.00	50.62	92.00	90.60	8.00	9.00	7.00

4. Torque Value

Table 8. Tightening Torque Values [Metric Course]

Bolts Diameter	Class 4.6 Bolts				Class 8.8 Bolts				Nuts [Width Across Flats] [mm]
	*μ = 0.10		*μ = 0.14		*μ = 0.10		*μ = 0.14		
	Tightening Torque [N·m]	Preload [kN]	Tightening Torque [N·m]	Preload [kN]	Tightening Torque [N·m]	Preload [kN]	Tightening Torque [N·m]	Preload [kN]	
M5 × 0.8	1.9	2.74	2.4	2.59	5.2	7.40	6.5	7.00	8
M6 × 1.0	3.3	3.87	4.1	3.65	9.0	10.40	11.3	9.90	10
M8 × 1.25	8.0	7.10	10.1	6.70	21.6	19.10	27.3	18.10	13
M10 × 1.5	16.1	11.30	20.3	10.70	43.0	30.30	54.0	28.80	17
M12 × 1.75	27.0	16.40	34.0	15.50	73.0	44.10	93.0	41.90	19
M14 × 2.0	44.0	22.50	55.0	21.30	117.0	60.60	148.0	57.50	22
M16 × 2.0	67.0	30.90	85.0	29.30	180.0	82.90	230.0	78.80	24
M18 × 2.5	93.0	37.70	118.0	35.70	259.0	104.00	329.0	99.00	27
M20 × 2.5	131.0	48.30	167.0	45.80	363.0	134.00	464.0	127.00	30
M22 × 2.5	176.0	60.10	225.0	57.10	495.0	166.00	634.0	158.00	32
M24 × 3.0	226.0	69.50	287.0	65.90	625.0	192.00	798.0	183.00	36
M27 × 3.0	331.0	91.20	424.0	86.70	915.0	252.00	1176.0	240.00	41
M30 × 3.5	450.0	111.00	575.0	105.30	1,246.0	307.00	1597.0	292.00	46

Table 9. Tightening Torque Values [UNC Threads]

Bolts Diameter	UNC Grade 2 Bolts			UNC Grade 5 Bolts			UNC Grade 8 Bolts			Nuts [Width Across Flats] [in]
	Tightening Torque [lb·ft]			Tightening Torque [lb·ft]			Tightening Torque [lb·ft]			
	*K = 0.20 Plain [Dry]	*K = 0.15 Lightly Lubricated	*K = 0.10 Well Lubricated	*K = 0.20 Plain [Dry]	*K = 0.15 Lightly Lubricated	*K = 0.10 Well Lubricated	*K = 0.20 Plain [Dry]	*K = 0.15 Lightly Lubricated	*K = 0.10 Well Lubricated	
1/4 - 20	5	4	3	8	6	4	12	9	6	7/16
5/16 - 18	11	8	6	17	13	9	25	18	12	1/2
3/8 - 16	20	15	10	31	23	15	44	35	22	9/16
7/16 - 14	32	24	16	49	35	25	70	55	35	5/8
1/2 - 13	49	35	24	75	55	38	107	80	53	3/4
9/16 - 12	70	55	35	109	80	54	154	110	77	7/8
5/8 - 11	97	75	48	150	110	75	212	170	106	15/16
3/4 - 10	173	130	86	266	200	133	376	280	188	1.1/8
7/8 - 9	166	125	83	429	320	215	606	460	303	1.5/16
1 - 8	250	190	125	644	480	322	909	680	454	1.1/2
1 1/8 - 7	354	270	177	794	600	397	1,287	960	644	1.11/16
1 1/4 - 7	500	380	250	1,120	840	560	1,875	1,360	938	1.7/8
1 3/8 - 6	655	490	327	1,469	1,100	734	2,382	1,780	1,191	2.1/16
1 1/2 - 6	870	650	435	1,950	1,460	975	3,161	2,360	1,581	2.1/4